

# Mars Exploration Rover Mission

**Spirit  
and  
Opportunity**

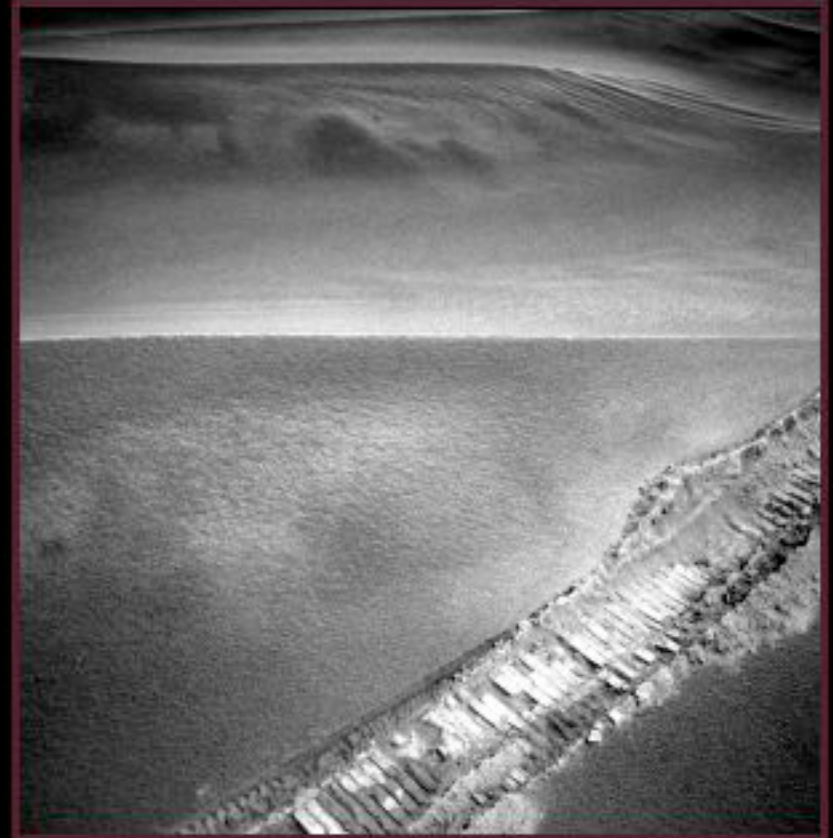


**Month in Review  
May 28, 2005 - June 30, 2005**

## Spirit and Opportunity celebrated 500 sols on Mars!



*Spirit navigation camera, June 3, 2005 (sol 503). NASA/JPL*



*Opportunity navigation camera, June 22, 2005 (sol 501). NASA/JPL*

**The rovers have survived over four times  
their life-expectancy goals on Mars.**

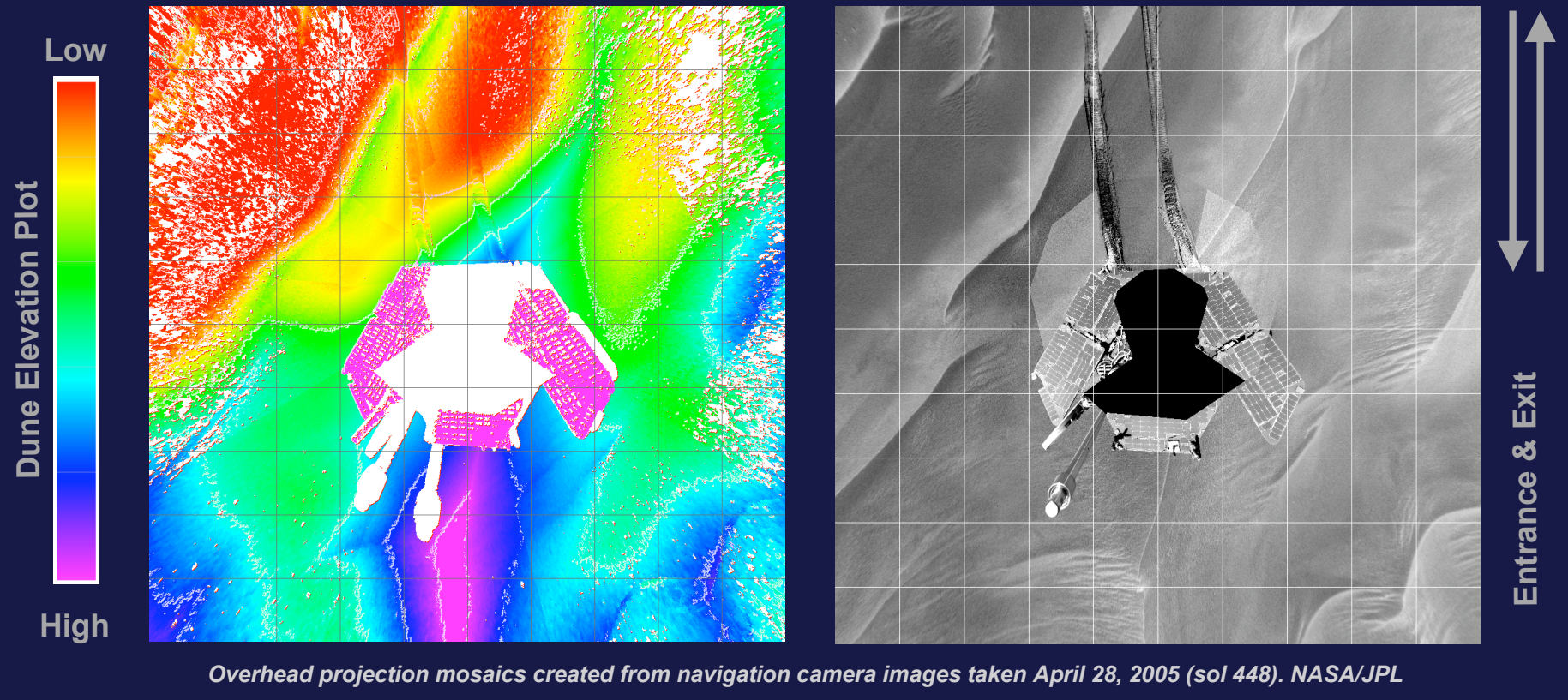
**Opportunity survived the trap of “Purgatory Dune,”  
inching free of its 5-week hold in wheel-sinking sand!**



*Navigation camera, June 11, 2005 (sol 491). NASA/JPL*



**Mobility engineers decided the safest route to exit Purgatory was to go back the way they came.**



**Opportunity had been driving backwards when it entered the dune, and then drove out moving forward.**



**As Opportunity churned the first three feet out of the slippery dune, the wheels spun enough times to have moved 581 feet (177.2 meters).**



12:32



13:09



13:15



13:27



13:33



13:44



14:58



15:11

*Front hazard-avoidance camera, Mars Local Solar Time, June 2, 2005 (sol 482). NASA/JPL*

**Once Opportunity was safe on higher ground,  
the team sent the rover BACK to Purgatory Dune!**



*Mobility engineer Mark Maimone next to the test rover in the "Mars Sandbox" at JPL.*

**Rover drivers wanted to figure out how to  
steer clear of another dune ambush.**



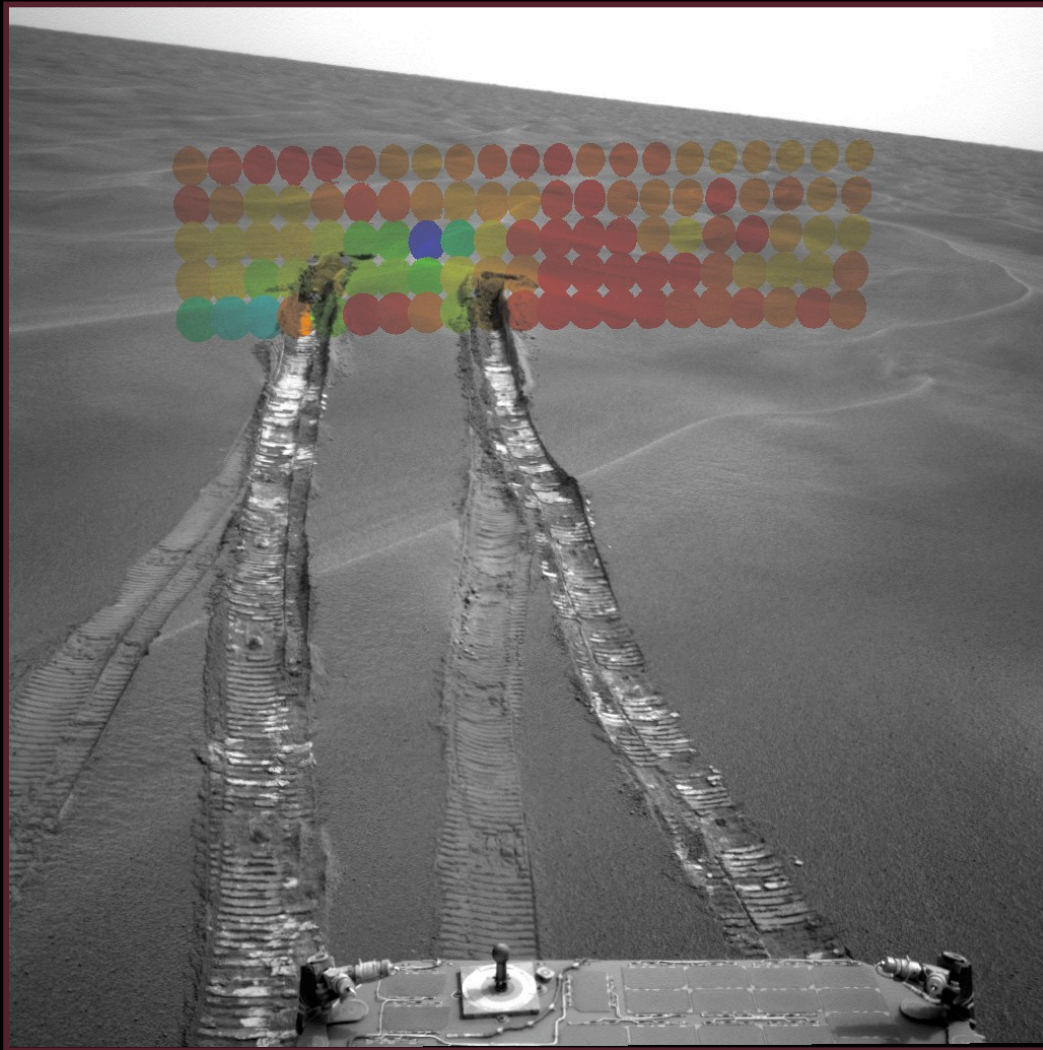
**Science team members also wanted to characterize Purgatory Dune to understand why this ripple stopped the rover when others had not.**



*False-color panoramic camera image, June 16 (sol 496). NASA/JPL/Cornell*



**One theory from the Mini-TES team is that temperature can give clues to potential “stuck spots.”**



**Looking back, the rover got stuck in a spot that was cooler than elsewhere.**

**That might indicate that a surface crust covered finer grained sand beneath that the rover couldn't at first escape.**

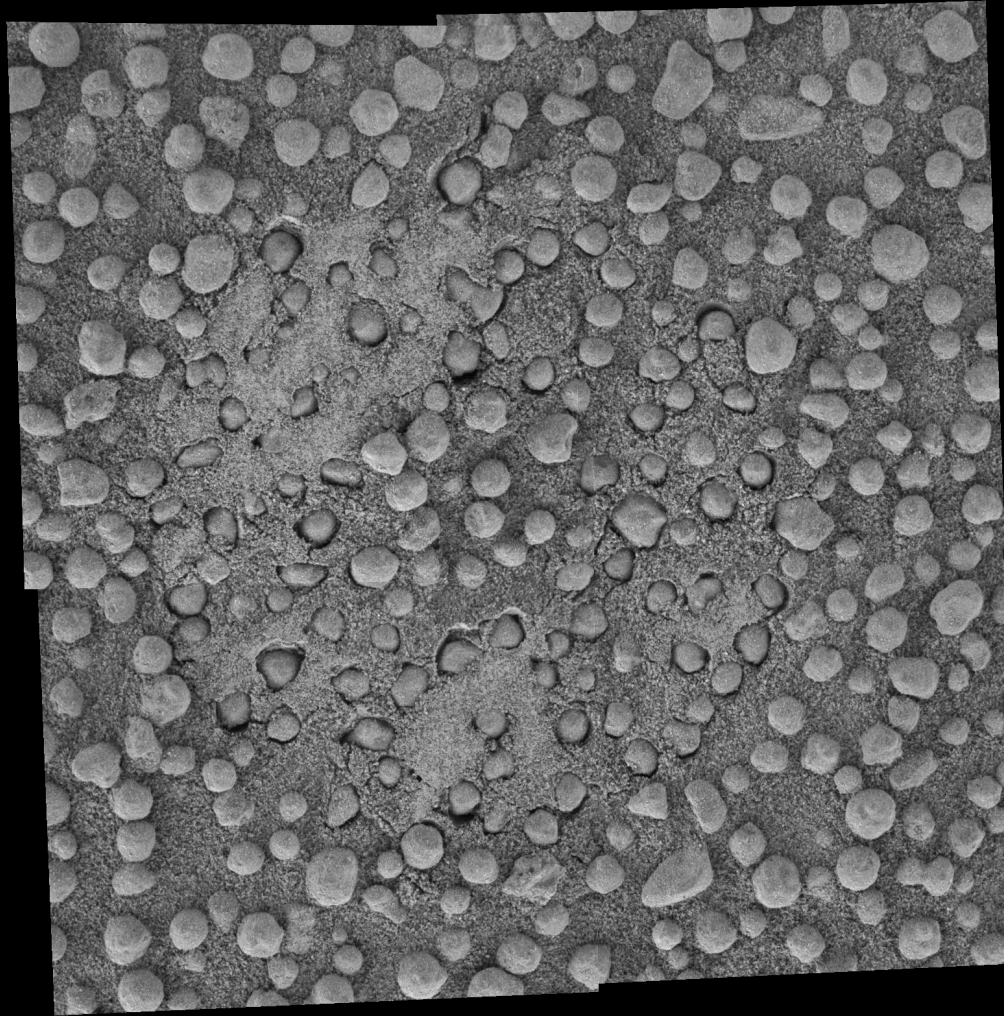


Cool



Warm

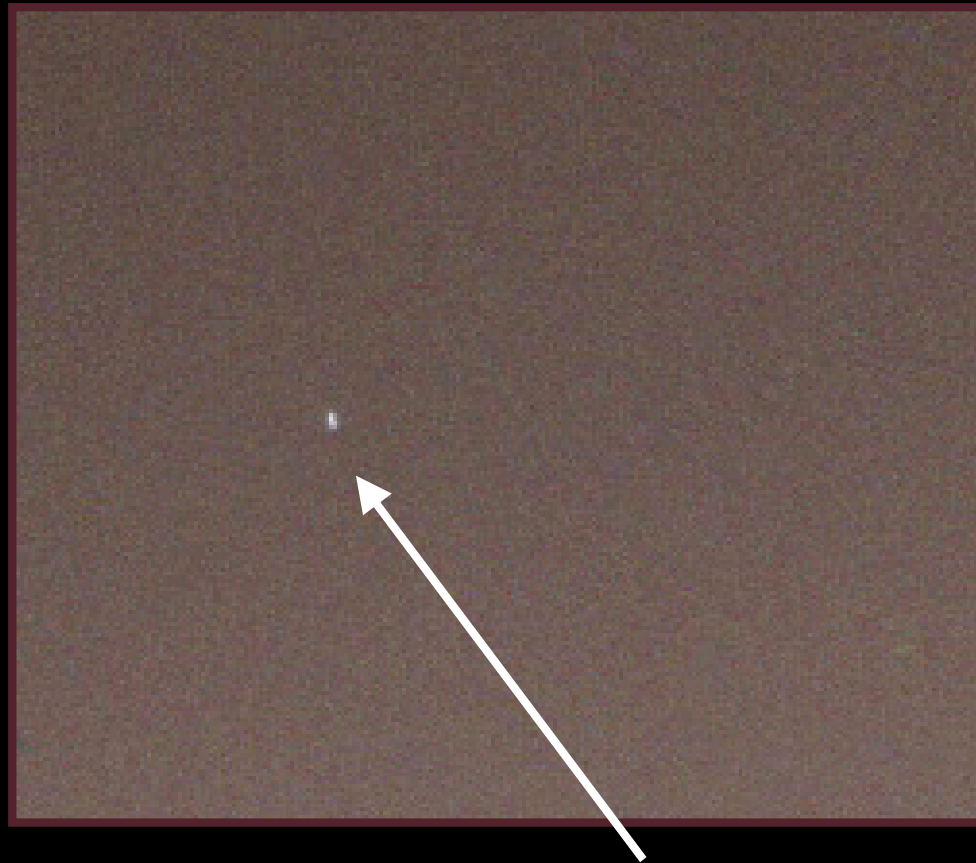
**Team members are still analyzing  
the science data from Purgatory Dune.**



*Microscopic Imager mosaic of "Troughplain," June 26, 2005 (sol 505). NASA/JPL/Cornell*

**While Opportunity's view of the sand caused a bit of stress,  
the rover's view of the sky was awe-inspiring.**

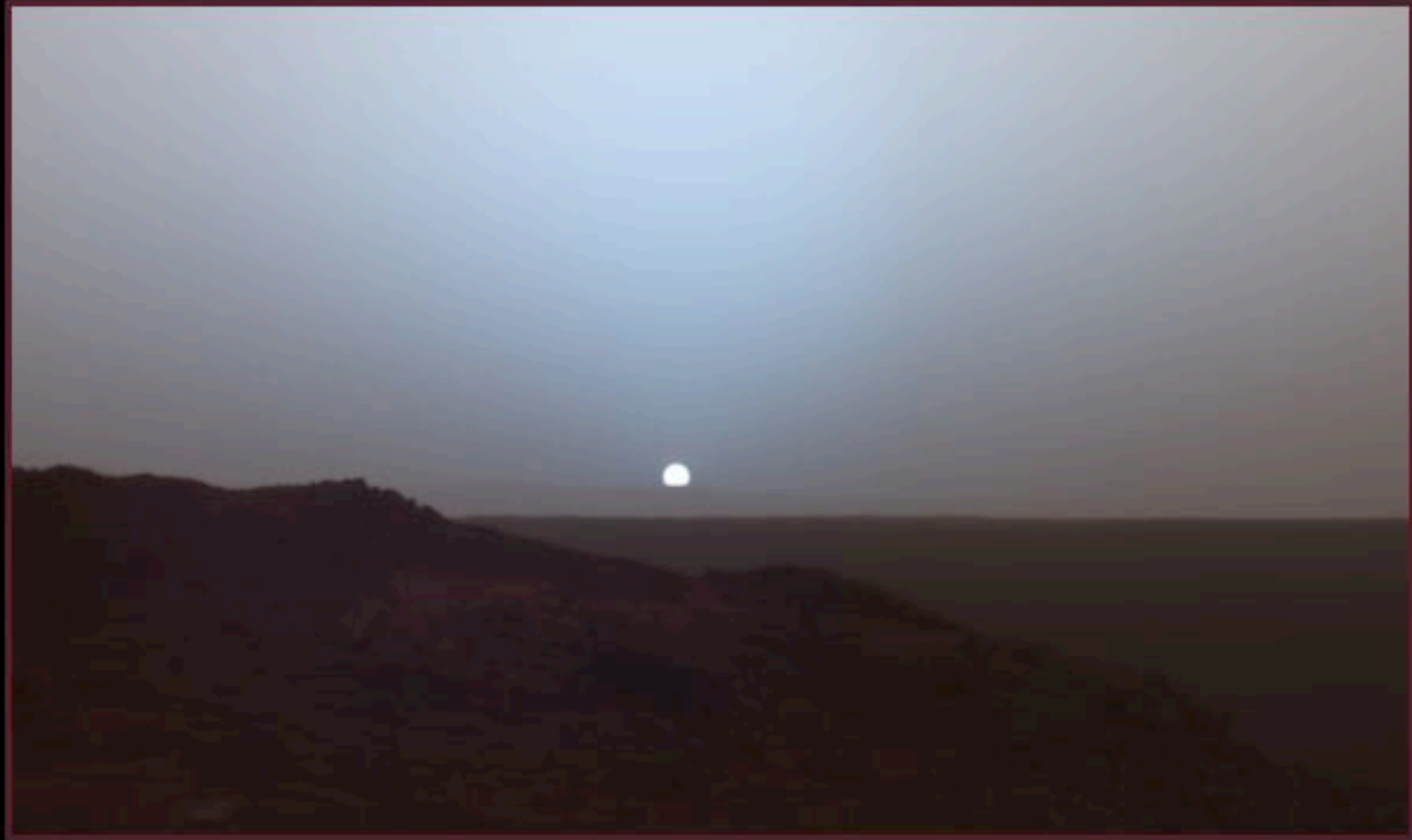
*Panoramic camera,  
April 29, 2005 (sol 449).  
NASA/JPL/Cornell/Texas A&M*



**Opportunity viewed Earth at twilight.  
Earth appears elongated because it moved  
slightly during the 15-second camera exposures.**

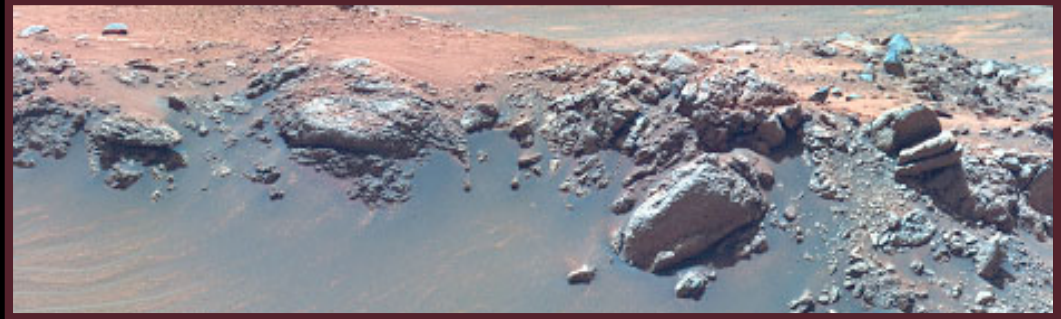


**On the opposite side of Mars,  
Spirit captured the Sun setting  
against the rim of Gusev Crater!**



*Panoramic camera, May 19, 2005 (sol 489).  
NASA/JPL/Cornell/Texas A&M*

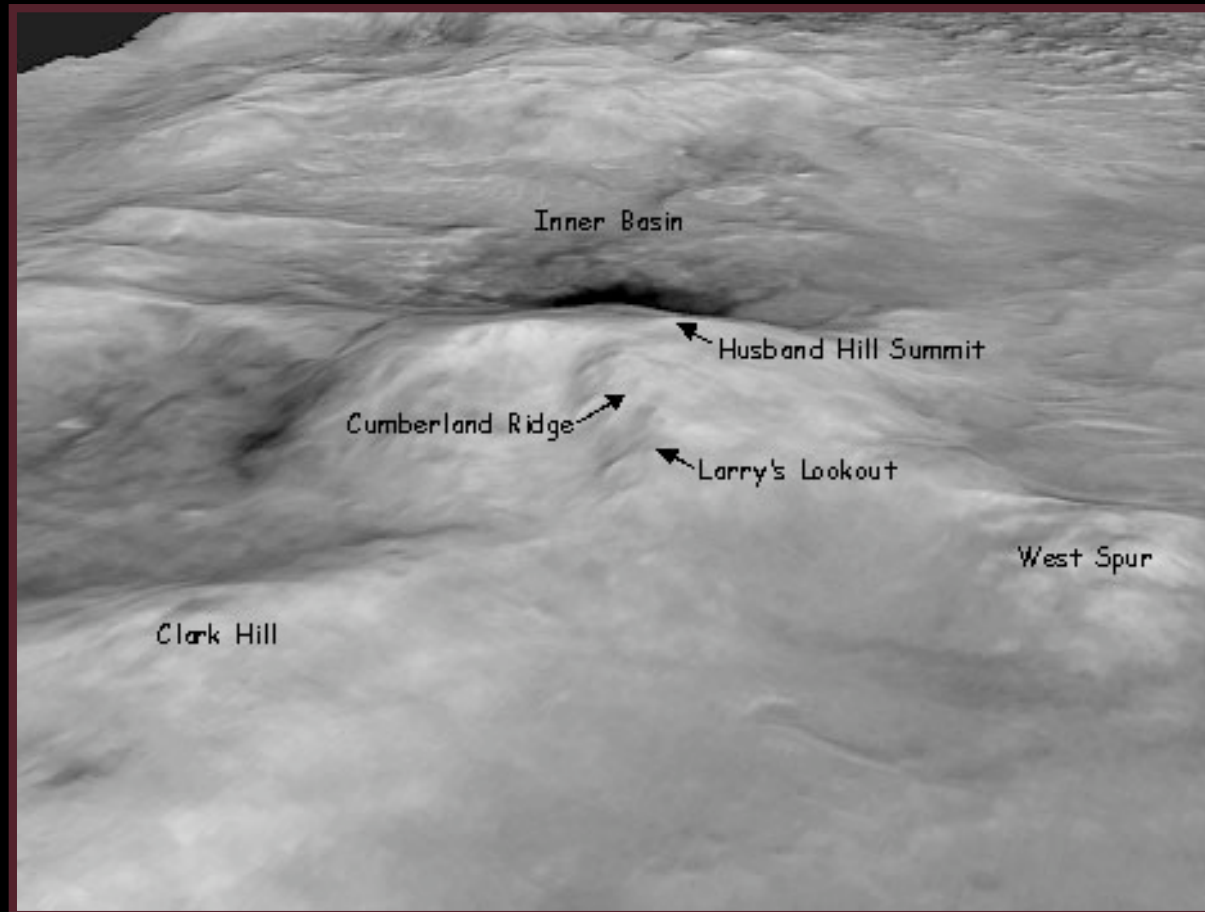
**Spirit also investigated more rocks at Larry's Outcrop, Jibsheet, and Methuselah.**



*False-color panoramic camera, May 2005. Larry's Outcrop (left), Jibsheet (top right), Methuselah (bottom right). NASA/JPL/Cornell*

**The rocks basically have the same chemical composition, but show huge diversity in texture, probably because they were altered by the martian environment in different ways.**

**Spirit is striking out toward new territory, and the team is now faced with the decision whether or not to attempt to reach the summit of Husband Hill.**



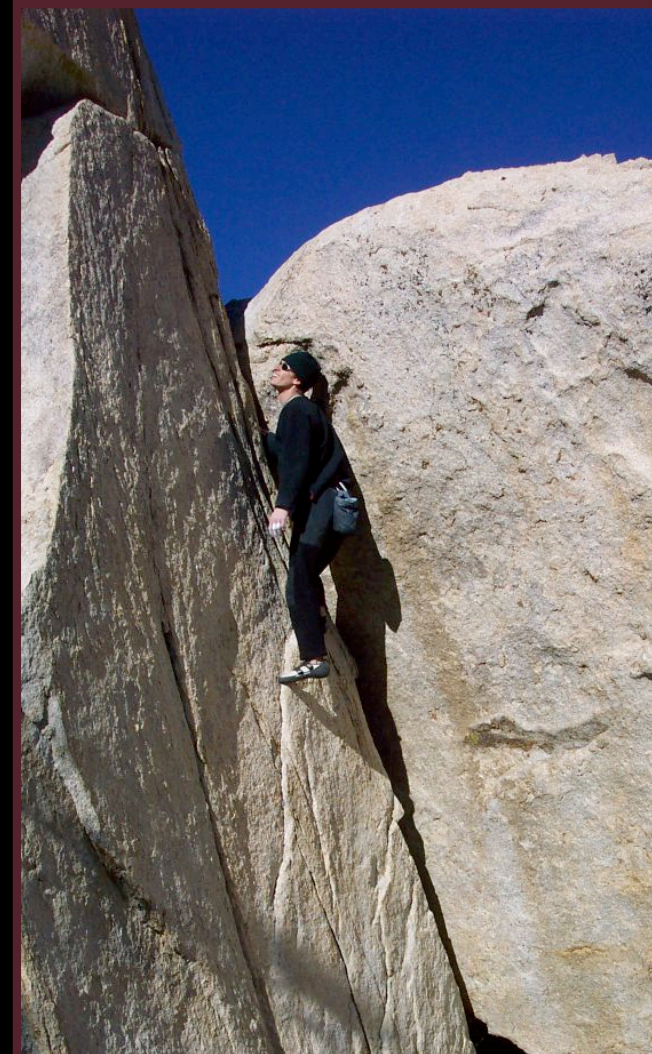
*Three-dimensional terrain model comprised of images taken by the Mars Orbiter Camera on Mars Global Surveyor, processed by the U.S. Geological Survey.  
NASA/JPL/MSSS/USGS/NMMNH*



**Many rover team members are fans of mountaineering on both Earth and Mars, but are cautious about making the best science decisions for Spirit.**

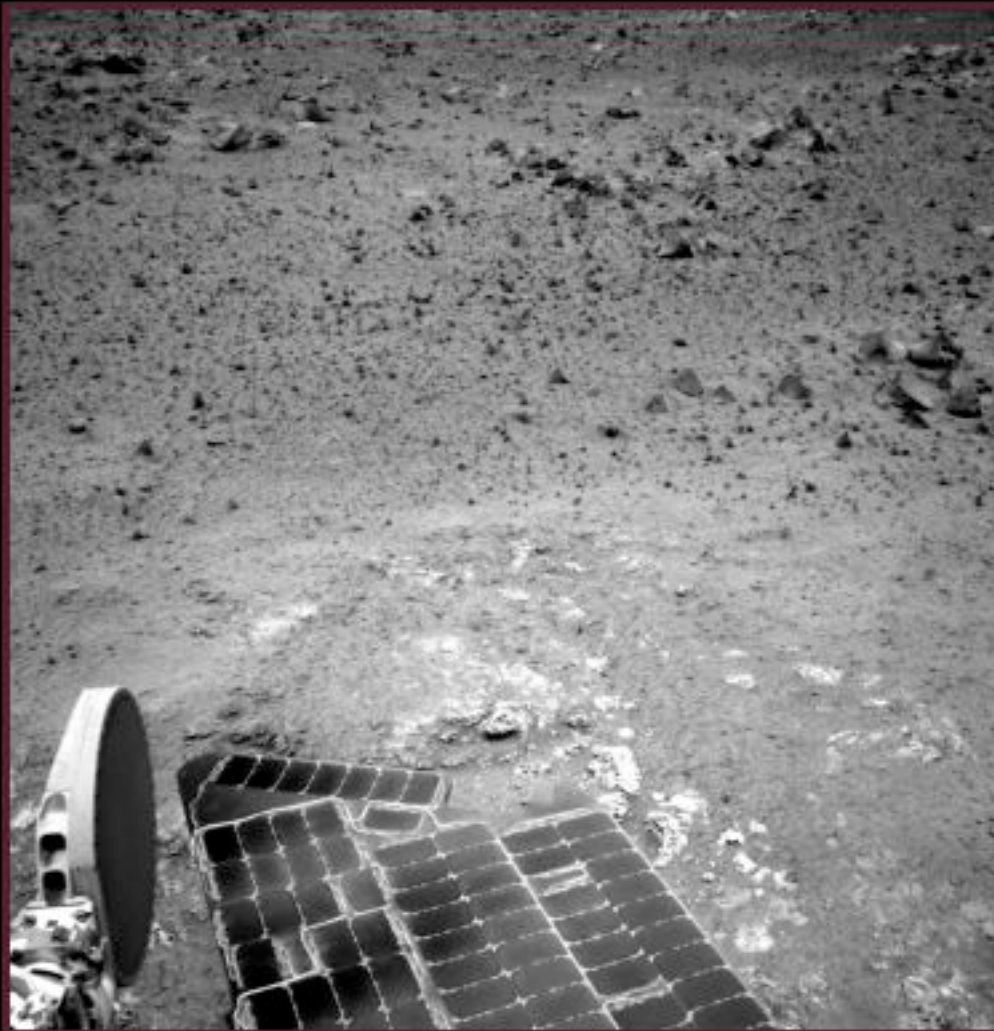


*Principal Investigator, Steve Squyres, ice climbing near Ithaca, New York.*



*Rover driver, Chris Leger, bouldering at Horse Flats near Pasadena, California.*

**Spirit is currently cruising on firm ground at Gusev, which makes for great traction and great climbing.**

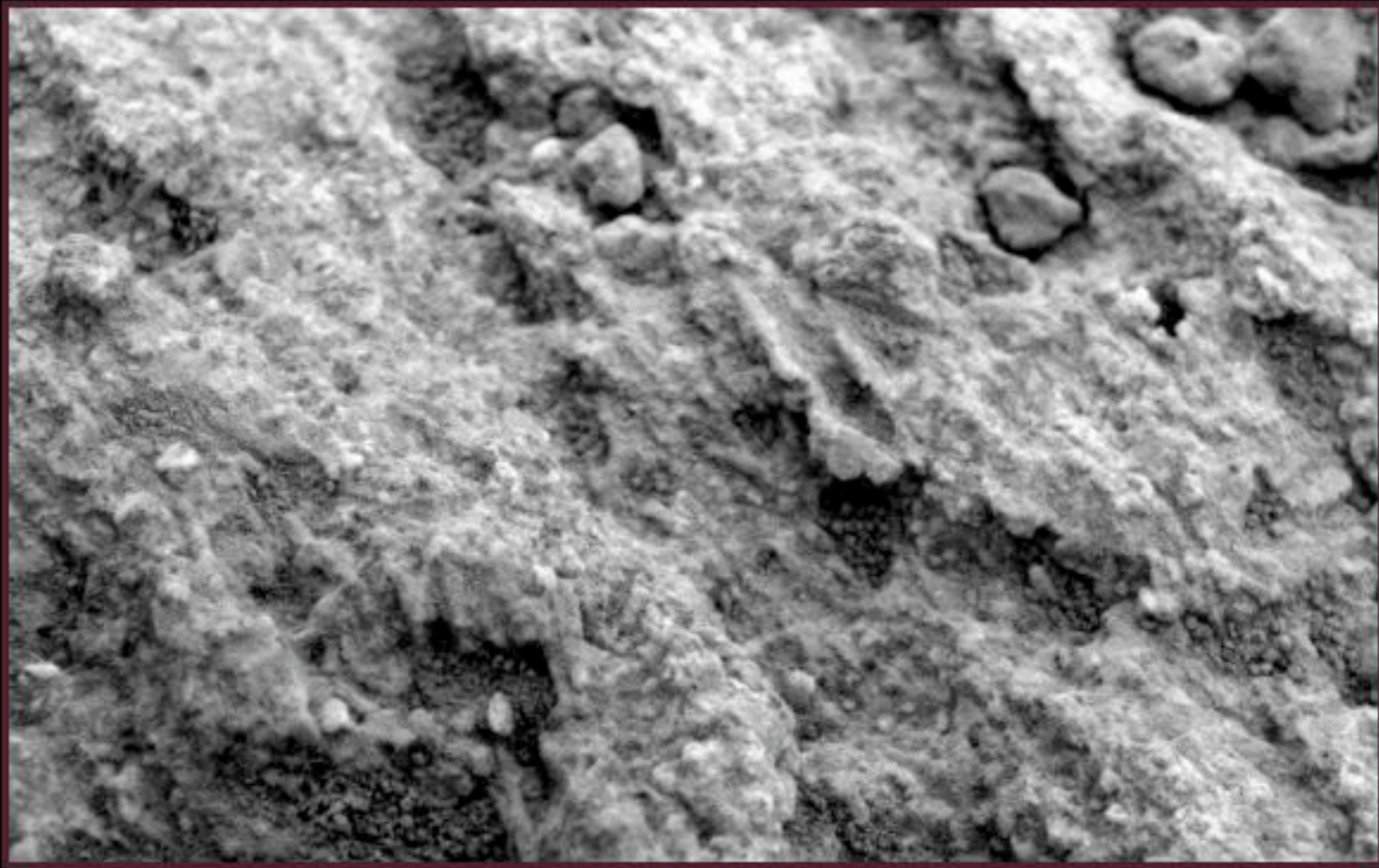


**But, it looks like the terrain will transition to softer ground near the summit of Husband Hill.**

*Navigation camera, June 28, 2005 (sol 528). NASA/JPL*



**While the team weighs the value versus the risk of going to the top of Husband Hill, Spirit will spend the 4th of July weekend studying a layered rock named “Independence.”**



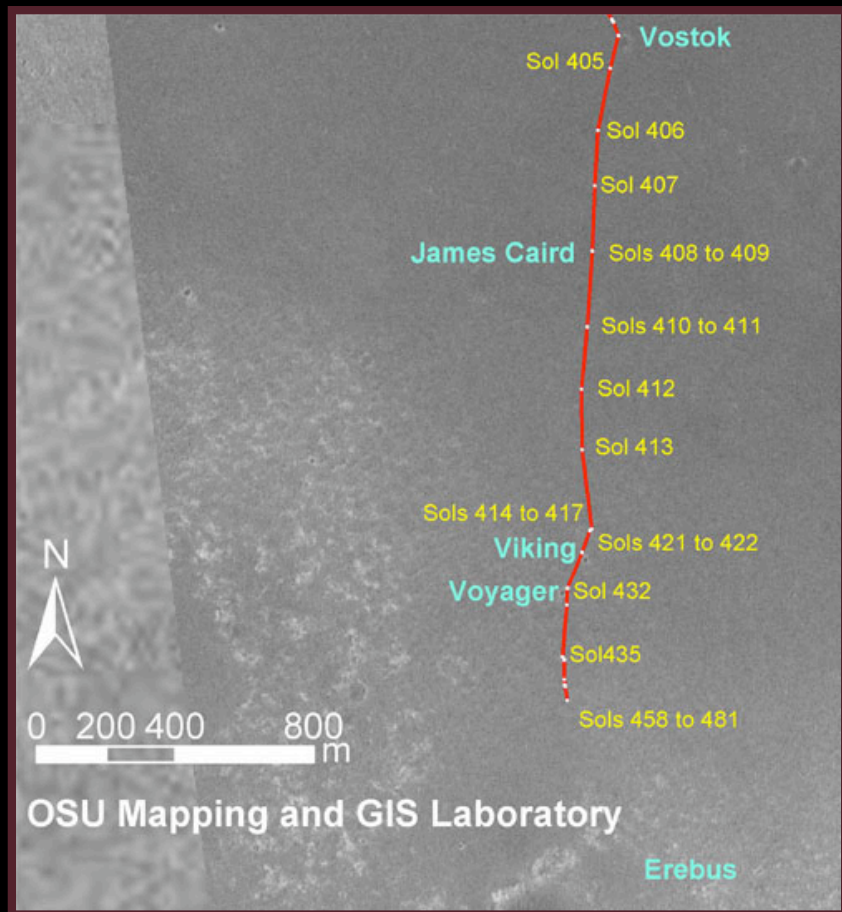
*Microscopic Imager, June 29, 2005 (sol 529). NASA/JPL/Cornell*





**After the holiday weekend, Spirit's team will decide whether to aim for the summit.**

**Opportunity will travel north for safety, then head south toward the etched terrain of Erebus.**



*Opportunity orbital traverse map. NASA/JPL/MSSS*